## REMARKS

The Office Action mailed April 21, 2005, has been received and reviewed. Claims 45-64 are currently pending in the application. Claims 45-54 stand rejected. Claims 55-64 are allowed. Applicants note with appreciation the allowance of claims 55-64. Applicants have amended claims 46-52, 58, 60, 62, and 63 and respectfully request reconsideration of the application as amended herein.

**Claim Objections**

Claims 46-52, 58, 60, 62, and 63 are objected to due to alleged informalities in the claim language. To further the prosecution of the above-referenced application, these claims have been amended to adopt the Examiner's suggestions. However, Applicants believe that the claim language was clear in its unamended form and, therefore, that these amendments are not necessary to the allowance of the claims.

**35 U.S.C. § 103(a) Obviousness Rejections**

Obviousness Rejection Based on U.S. Patent No. 5,728,625 to Tung in view of U.S. Patent No. 4,782,037 to Tomozawa *et al.* and further in view of U.S. Patent No. 6,465,295 to Kitamura

Claims 45-54 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,728,625 to Tung ("Tung") in view of U.S. Patent No. 4,782,037 to Tomozawa *et al.* ("Tomozawa") and further in view of U.S. Patent No. 6,465,295 to Kitamura ("Kitamura"). Applicants respectfully traverse this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for an obviousness rejection:

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir.

1991).

The obviousness rejection of claims 45-54 is improper because the cited references do not teach or suggest all of the claim limitations and do not provide a motivation to combine to produce the claimed invention.

Tung teaches forming a layer of cobalt silicide, as a conductive layer, on a semiconductor substrate. Tung at column 1, lines 7-9. A silicon dioxide layer is first formed on portions of the semiconductor substrate. *Id.* at column 6, lines 55-63. A gate insulating film is then formed on active regions between the silicon dioxide layer. *Id.* at column 6, line 66 through column 7, line 1. A polycrystalline silicon film is formed on the gate insulating film, followed by the formation of a tungsten silicide layer on the polycrystalline silicon film. *Id.* at column 7, lines 1-5. The tungsten silicide layer is implanted with dopants and a hard mask layer, such as a silicon dioxide layer, is formed on the tungsten silicide layer. *Id.* at column 7, lines 5-12.

Tomozawa teaches a method of fabricating a semiconductor integrated circuit device. Tomozawa at column 1, lines 11-19. A conductive layer that includes a polycrystalline silicon layer and a silicide layer is formed on a p-type semiconductor substrate. *Id.* at column 3, line 54 through column 4, line 6. An insulating film is formed over the conductive layer. *Id.* at column 4, lines 38-40. The insulating film is a silicon nitride film, a silicon dioxide film, or a phosphosilicate glass film. *Id.* at column 4, lines 45-54. The insulating film reduces stress and prevents the polycrystalline silicon layer from separating from the silicide layer. *Id.* at column 4, lines 38-44.

Kitamura teaches a method of fabricating a field-effect semiconductor device. Kitamura at column 1, lines 6-8. A doped substrate is formed that has an N well layer. *Id.* at column 5, lines 41-46. A gate oxide film is formed over the N well layer and impurities are introduced. *Id.* at column 5, lines 54-55. A polysilicon film is formed over the gate oxide film and is subsequently doped with a boronic compound. *Id.* at column 5, lines 56-61. A tungsten silicide film is formed over the polysilicon film and etched to form polycide gates. *Id.* at column 7, lines 3-7. A dielectric layer is then formed over the surface of the substrate by chemical vapor deposition ("CVD") at a temperature of less than 850°C, such as at 400°C. *Id.* at column 7, lines 8-11.

The cited references do not teach or suggest all of the limitations of independent claim 45 because Tung, Tomozawa, and Kitamura, when combined, do not teach or suggest the limitation of "forming a silicon nitride layer on the metallic silicide film at a sufficiently low temperature to maintain the metallic silicide film in an amorphous state." As acknowledged by the Examiner, Tung and Tomozawa do not teach or suggest this limitation. Office Action of April 21, 2005, p. 3. Therefore, the Examiner relies on Kitamura as teaching this limitation. The Examiner states that Kitamura "discloses a method of forming a cap layer at a sufficiently low temperature" at column 7, lines 8-11. Office Action of April 21, 2005, p. 3. While the cited section of Kitamura teaches that a CVD-grown dielectric film is formed at a temperature of less than 850°C, Kitamura does not teach or suggest that this layer is a silicon nitride layer. Rather, Kitamura is, at best, silent regarding the material from which its CVD-grown dielectric film is formed. Therefore, Kitamura does not teach or suggest the limitation of "forming a silicon nitride layer on the metallic silicide film at a sufficiently low temperature to maintain the metallic silicide film in an amorphous state."

Since the cited references do not teach or suggest all of the limitations of claim 45, the obviousness rejection is improper and should be withdrawn.

Claims 46-54 are allowable, *inter alia*, as depending from an allowable base claim.

The cited references also do not provide a motivation to combine to produce the claimed invention. To provide a motivation or suggestion to combine, the prior art or the knowledge of a person of ordinary skill in the art must "suggest the desirability of the combination" or provide "an objective reason to combine the teachings of the references." M.P.E.P. § 2143.01. The mere fact that references <u>can</u> be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *Id.* (emphasis in original).

The Examiner acknowledges that Tung does not teach or suggest the limitation of "forming a silicon nitride layer on the metallic silicide film at a sufficiently low temperature to maintain the metallic silicide film in an amorphous state." Office Action of April 21, 2005, p. 3. Therefore, the Examiner relies on Tomozawa as teaching a cap layer formed from silicon oxide or silicon nitride. *Id.* The Examiner states that "it would have been obvious to one

of ordinary skill in the art at the time the invention was made to form the cap layer of Tung by silicon nitride, such as taught by Tomozawa et al. since silicon oxide and silicon nitride are commonly used as the cap layer and they are interchangeable." *Id.* However, Applicants respectfully submit that nothing in Tung or Tomozawa suggests the desirability of, or provides an objective reason for, combination. Specifically, Tung does not suggest the desirability of, or provide an objective reason for, forming its hard mask layer from silicon nitride. While the insulating film in Tomozawa is a silicon nitride or a silicon dioxide film, Tomozawa does not suggest the desirability of, or provide an objective reason for, using a silicon nitride film as the hard mask layer in Tung. Rather, the insulating film in Tomozawa reduces stress and prevents the polycrystalline silicon layer in the semiconductor integrated circuit device from separating from the silicide layer, none of which are at issue in Tung.

In addition, the knowledge of a person of ordinary skill in the art does not suggest the desirability of, or provide an objective reason for, using silicon nitride as the hard mask layer in Tung. The Examiner states that this would be obvious because silicon oxide and silicon nitride are interchangeable. However, this conclusory statement is not "based on objective evidence of record" that supports combination of the cited references. *In re Lee*, 277 F.3d 1338, 1343 (Fed.Cir. 2002). It is axiomatic that the Examiner's proposed motivation to combine can not "be resolved on subjective belief and unknown authority." *Id.* at 1344.

As acknowledged by the Examiner, Tung and Tomozawa "do not disclose forming the cap layer at a sufficiently low temperature to maintain the metallic silicide film in an amorphous state." Office Action of April 21, 2005, p. 3. Therefore, the Examiner relies on Kitamura as teaching the limitation of "forming a silicon nitride layer on the metallic silicide film at a sufficiently low temperature to maintain the metallic silicide film in an amorphous state." The Examiner states that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the cap layer of Tung and Tomozawa et al. at a sufficiently to [sic] temperature, such as taught by Kitamura in order to increase the threshold voltage of the transistor." *Id.* However, nothing in the cited references suggests the desirability of, or provides an objective reason for, combination. Neither Tung nor Tomozawa suggests the desirability of, or provides an objective reason for, forming a silicon nitride layer at a sufficiently low

temperature to maintain the metallic silicide film in an amorphous state. Tung does not teach or suggest forming a silicon nitride layer and, therefore, does not suggest the desirability of, or provide an objective reason for, forming a silicon nitride layer at a sufficiently low temperature to maintain the metallic silicide film in an amorphous state. Tomozawa does not teach or suggest a temperature at which its insulating film is formed and, therefore, necessarily does not suggest the desirability of, or provide an objective reason for, forming a silicon nitride layer at a sufficiently low temperature to maintain the metallic silicide film in an amorphous state. In addition, since Kitamura does not teach or suggest that its CVD-grown dielectric film is a film of silicon nitride, Kitamura necessarily does not suggest the desirability of, or provide an objective reason for, forming a silicon nitride layer at a sufficiently low temperature to maintain the metallic silicide film in an amorphous state.

Furthermore, since Kitamura does not teach or suggest that its CVD-grown dielectric film is a silicon nitride film, the claimed invention would not be produced even if the cited references were combined.

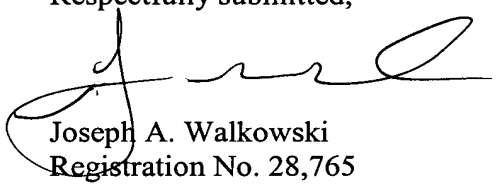
## ENTRY OF AMENDMENTS

The amendments to claims 46-52, 58, 60, 62, and 63 above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add new matter to the application.

## CONCLUSION

Claims 45-54 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Claims 55-64 have already been indicated as allowed by the Examiner. Should the Examiner determine that additional issues remain that might be resolved by a telephone conference, he is respectfully invited to contact Applicants' undersigned attorney.

Respectfully submitted,



Joseph A. Walkowski
Registration No. 28,765
Attorney for Applicants
TRASKBRITT
P.O. Box 2550
Salt Lake City, Utah 84110-2550
Telephone: 801-532-1922

Date: July 19, 2005
KAH/djp:slm
Document in ProLaw